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## SYNTAX ZX80 UPDATES NAME

SYNTAX ZX80 now answers officially to its abbreviated name, SYNTAX. The words replacing "ZX80" on the banner reflect the change in North America to the TS1000 computers. They also emphasize our exclusive coverage of all Timex-Sinclair computers. As Timex introduces new computers, you'll find them covered in SYNTAX.

## VIDEO UPGRADE KITS FOR ZX80 IN US AGAIN

Once again ZX80 and MicroAce owners can enjoy the flicker-free qualities of ZX81/TS1000s. Kits, available in mid-August, install inside computer case. Full kits \$32.50 plus \$2.50 first class postage. Plans \$2.00 plus \$.50 postage. Printed circuit board with instructions \$19.95 plus \$1.25 postage. Orders are now being accepted by Computer Engineering Services, PO Box 1222, Show Low, AZ 85901, 602/537-7522. Specify ZX80 or MicroAce when ordering.

## SYNTAX QUARTERLY DEBUTS NOV.82

SQ, The Syntax Quarterly, will be available by subscription and on newsstands Nov. 1, 1982. (Ask your local computer store.) The first issue will run about 64 pages devoted to ZX and Timex-Sinclair computers.

Because of its quarterly publication, SQ will not cover news. Instead, it will provide longer programs, more extensive hardware projects, and more in-depth tutorials than the SYNTAX newsletter.

All SYNTAX subscribers will receive the premiere issue of SQ free. Combined SYNTAX-SQ subscriptions will cost \$39 per year (12 issues of SYNTAX, 4 issues of SQ). SQ will be available separately for \$15 per year.

Address SQ program, project, or article submissions to Syntax Quarterly, RD 2 Box 457, Harvard, MA 01451.

SYNTAX ERRORS: In the Apr.82 logic probe construction project, the LED resistors should be 330 Ohms.

Numbers Held Inexactly in the ZX81 (Jun.82) contains two errors. On p.19, second paragraph, line 3, the last number should be 205, not 204. On p.20, this line is missing after line 11: .1 gives 125 76 204 204 205.

General Technology's phone no. (Jul.82 p.22) is 401/273-2420.

#### NEWS, NEW PRODUCTS AND SERVICES

Help your first-sixth graders learn at home. International Learning Materials is producing child-tested math, reading and grammar software packages for ZX81s. Two math packages, about \$29.95 each, will be available Sept. 1. Each contains 2 tapes (16 lessons each) and a workbook. Available from Gladstone Electronics, 1736 Avenue Rd., Toronto, Ontario, Canada M5M 3Y7 and Reston Publishing, 599 Adamsdale Rd., N. Attleboro, MA 02760. For more info, write Joseph Gladstone, International Learning Materials, 95 Perivale Cres., Scarborough, Ontario, Canada M1J 2C4.

In the offing: 16K EPROM and full-sized keyboard from Memotech Corp., early this fall. EPROM (erasable programmable read-only memory) lets users with PROM-blowing capability store programs directly in a read-only memory. EPROM will run about \$70 blank, according to Said Fateh of Memotech. Big keyboard will connect to computer's rear, so you need no wiring inside the computer. Price: under \$80. Memotech Corp., 7550 West Yale Ave., Suite 200, Denver, CO 80227, 303/986-1516.

Instant Software needs programmers to convert TRS-80 software to TS1000 BASIC. If you're interested, send your name, address, and a description of your equipment to Kevin Burton, Instant Software, 80 Pine St., Peterborough, NH 03458.

Sinclair's own software written by Psion and ICL is available in the US. Packages include business (\$14.95-\$17.95), education (\$12.95 each) and games (\$8.95-\$13.95). Most programs require 16K RAM. Sinclair Research, 3 Sinclair Plaza, Nashua, NH 03061.

Get organized with a Consol-Kit assembly from Hopper & Company. Designed to fit Radio Shack's Miniset 9 tape deck and RCA's Playmate 9" TV, Consol-Kit assembles into a complete computing center with space for your ZX computer, RAM pack and tapes. Full size plans, \$5; pre-cut kit \$39.95 (7-ply birch plywood). For more info, send \$1 to Hopper & Company, Inc., Box 689 Blue Hills Rd., Durham, CT 06422 or call 203/349-8424.

Gladstone's full-size portable typewriter keyboards plug into ZX81 PC board. You get standard Sinclair legends on removable keytops, a full-size space bar and seven extra keys, plus an edge card connector for adding extra memory. Price: \$109.95 Canadian, \$85.00 US. Enclose it all in a black anodized metal case, \$29.95 Canadian, \$25 US. Gladstone Electronics, 1736 Avenue Rd., Toronto, Ontario M5M 3Y7, 416/787-1448.

MX-Pac is designed to help you grow from program user to program writer. According to Bill Hoffman, MX-Pac consists of 18 programs for 8K/1K on cassette with complete listings and explanations. Programs range from simple to sophisticated and include Printout I, a multi-level support and self-teaching guide. Price: \$24.95. Bill Hoffman, Robill Products, 555 Park Ave., Paterson, NJ 07504.

Dave Hallas tells us Programming for Real Applications by Randle Hurley, reviewed Jun.82, is \$9.95 from Dilithium Press, PO Box 606, Beaverton, OR 97075, 800/547-1842.



Data-assette introduces a whole line of ZX hardware and software. In addition to their ZX99 tape controller and serial printer interface, they offer: 16K, 32K and 64K RAM packs (send your 16K and get \$15 off 64K); mini- and full-size keyboards (full size with repeat key); business, home and game software (including a word processor); computer cassettes, storage racks, labels and repair kits. Data-assette, 52 S. 3rd St., Oxford, PA 19363, 215/932-3626.

**ADDENDUM TO CAI PRINTER REVIEW (Jul.82):** To use the CAI/O board and Memotech's 64K RAM, first plug the RAM into the computer. Then plug the CAI/O board into the RAM. Also note that if you use software with imbedded keyboard printer commands, you will have to change each command to the correct USR call.

#### USERS' GROUPS

To list your group, call 617/456-3661 or write SYNTAX, RD 2 Box 457, Harvard, MA 01451. To find a group in your area, call or send us an SASE and we'll send you what information we have.--AZ

**Seabrook/Lanham, MD:** Lanham Sinclair User's Group, Cora C. Dickson, 9528 Elvis Ln., Lanham, MD 20706, 301/577-6645.

**Manitoba, Canada:** Sinclair Users' Group, Box 777, Swan River, Manitoba, R0L 1Z0

#### UPCOMING SHOWS AND EXHIBITIONS

**The US Festival:** Music festival and technology exhibit including professional and amateur hardware and software producers. Sept 3-5, 1982, Glen Helen Regional Park, San Bernardino County, CA

**The Twin Cities Computer Show:** Sept 16-19, 1982, Minneapolis Auditorium and Convention Hall.

## Available from SYNTAX...

For computing beginners —

**Crash Course in Microcomputers.....\$17.50**  
Covers hardware, machine language and applications. Reviewed in SYNTAX, Oct. 1981.  
Add \$1.50 shipping.

For advanced hardware/software users —

**Zilog's Z80-Z80A CPU  
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Gladstone Electronics' new US address, effective 1 Aug 82: 1585 Kenmore Ave., Buffalo, NY 14217.

SINE NAME--8K/1K

Print any string in the form of a vertical sine wave. Type in this program, RUN it, then enter a string of up to 12 characters. Along with letters, you can enter graphics characters for neat effects (for example, alternating spaces and solid black squares for an op-art design).

To run on an 8K ZX80, add:  
37 PAUSE 30

Change SIN in line 20 to COS for a cosine version.

Mark Freitas, Chelsea, MI

```
5 INPUT A$
10 FOR A=0 TO 6.3 STEP .2
20 LET Y=SIN A
30 PRINT AT 21, (10*Y+10);A$
35 SCROLL
40 NEXT A
50 GOTO 10
SYNTACTIC SUM: 7555, 8K
```

## TWO PROBLEM-SOLVING CIRCUITS--PREREGULATOR AND BATTERY BACKUP

Ed Battenhoff's pre-regulator circuit uses an LM340-8 regulator (May82). While it works fine, that regulator is not as commonly available as LM340-5. Fig. 1 following is a circuit that performs the same function as Ed's Fig. 1 and uses a garden-variety LM340-5 or 78L05 and two resistors to provide the 8-volt pre-regulation. You may replace the 100 Ohm resistor with a 100 Ohm trimpot in series with a 22 Ohm resistor to make the output adjustable; we recommend that you set the regulator output at 7.5 volts, which is plenty for operation while allowing the lowest possible line voltage (about 110 volts).

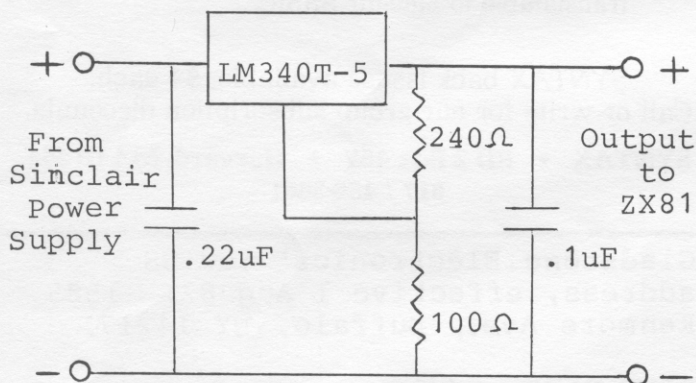


Figure 1--8V Preregulator

Resistors are 1/4 W, 5% film

Fig. 2 shows a circuit to provide battery backup for about one hour. Seven Nickel-Cadmium AA cells in series form the battery. It is recharged directly from the Sinclair power supply through R1 as long as power is present. Diodes D1 and D2 form a clamp which shuts the battery off when input voltage from the power supply is present but instantly connects the battery during a power interruption.

An optional SPST switch allows you to reset the computer without pulling the plug. We also suggest additional filter capacitor (C1)--

1000 uF or more. Also optional are transistor Q1, resistors R2 and R3, and LED1 which indicate that AC power is present when the LED is on. (This scheme is used instead of an LED and resistor across the input line as the battery would discharge through R1 and the LED with AC off and there is not enough output voltage from the Sinclair power supply to allow another diode drop and still charge the battery adequately.) Q1 is a PNP silicon transistor--2N4443, 2N3906, or similar. R2 and R3 are 1/4 W, R1 is 1/2 W. There is even enough room to install the entire circuit inside the ZX81 case if you're adventurous. This circuit is the same as that used in the SYNCWARE BBU-1 battery backup unit.

Note that the circuit in Fig. 2 cannot successfully be followed by the preregulator of Fig. 1 because the output voltage (taking diode drop into account) is in the vicinity of 8 volts--just enough to operate the ZX81 directly.

Our BBU-2 battery system uses 10 NiCd cells of higher capacity for longer running time, followed by a preregulator for cool running and improved glitch-rejection. This scheme requires a new power supply of about 16 volts; Sinclair's doesn't put out enough voltage to recharge the 12-volt battery. Not only does this type of system allow portable operation and protect against power-down, it also makes the ZX81 practically immune to line glitches and noise.

Fred Nachbaur, Syncware Co.,  
El Monte, CA

At SYNTAX we built the battery backup unit to test. Operation is just as described. Our unit fits in a small box (Radio Shack 270-233) which holds two, 4-cell plastic battery holders (RS 270-391). We rewired one holder to use



only 3 cells. You can use RS 23-125 cells for the NiCd battery, but they only provide 450 mAh and cost more than \$2 per cell.

If you'd rather not build your own, you can buy these battery packs from Syncware Co., 4825 Elrovia Ave., El Monte, CA 91732 for \$39.50-\$84.50. The schematic shown is their commercial unit. Patrick Spera called the BBU-2 "professional in appearance, performance and craftsmanship" in the Sinclair Computers User's Group of OK newsletter.--KO

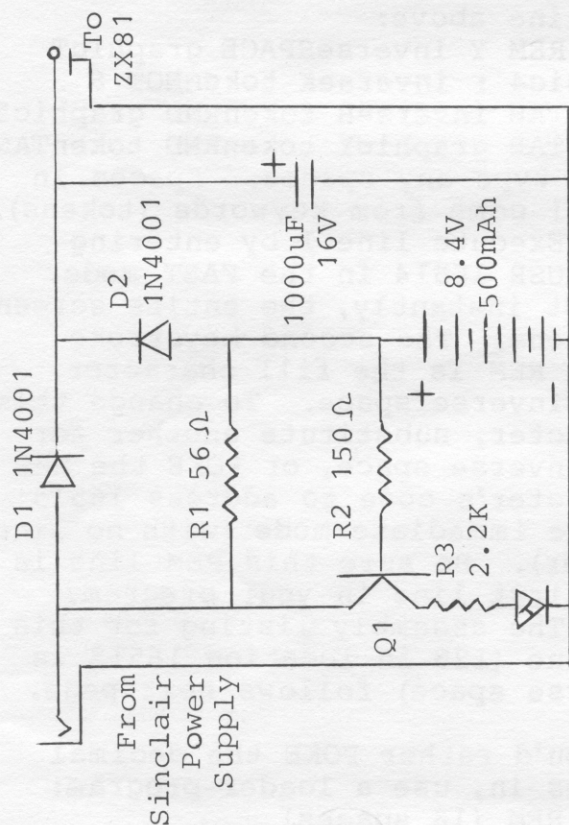


Figure 2

**WARNING:** Do not leave battery pack plugged into wall unless computer is connected. Batteries will overheat.

#### PRINTING STRINGS FASTER

While drawing some bar graphs in the SLOW mode, the PRINT routine was so slow I could actually see each character appear. I tried using the excellent string-handling capability of the 8K ROM. The

difference was dramatic. Try both of these in SLOW:

The slow way--

```
100 FOR I=1 TO N
110 PRINT "X";
120 NEXT I
```

The fast way--

```
100 LET L$="XXXXX...X" (at least N
Xs)
110 PRINT L$( TO N)
```

Martin H. Irons, K2MI, Goshen NY

Choose a fairly large number to substitute for N. If you have enough memory, this method certainly speeds string printing. The routine following demonstrates how fast it can be.--AZ

#### BLAST EFFECTS ON ZX81

This simple subroutine simulates laser, cannon shots, and other effects used in arcade-type games. You can easily modify it for your particular needs. Try substituting different characters in the strings or varying the number of strings used. Line 210 sequentially overprints A\$ through F\$ in a rapid and dramatically effective manner. With a little imagination, you can produce a variety of startling "blasts".

Dan Tandberg, Albuquerque, NM

```
1 REM "BLAST"
10 SLOW
20 LET A$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
30 LET B$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
40 LET C$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
50 LET D$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
60 LET E$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
70 LET F$="XXXXXXXXXXXXXXXXXXXXX
XXXXXXXXXX"
80 LET R=10
90 LET C=5
100 PRINT AT R,C-5;"XXXXXXXXXX"
110 PRINT AT R+1,C-5;"XXXXXXXXXX"
120 IF INKEY$="" THEN GOTO 200
130 PRINT AT R,C;A$;AT R,C;B$;AT
R,C;C$;AT R,C;D$;AT R,C;E$;AT
R,C;F$
140 GOTO 200
SYNTACTIC SUM: 22447, 8K
```

# 5..4..3..2..ZX81

## Lift off your ZX81 with these important books!



### Machine Language made simple —

an introduction to Assembly Language programming for the Sinclair ZX81.

### Understanding Your ZX81 —

understanding the monitor and help yourself to good machine language programs.

### Sinclair ZX81 ROM Disassembly Part A 0000H — 0F54H —

An examination and notes on covering all except expression evaluation.

### Sinclair ZX81 ROM Disassembly Part B 0F55H — 1DFFH —

An examination of all routines concerned with an evaluation of expressions, and including an analysis of floating point representation.

### Explorers Guide to the ZX81 —

Goes on where the manual leaves off — a wealth of detailed information on how to get the best out of your ZX81 but definitely not for the beginner.

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| SIGNATURE _____                                                                                        |                              |                          |         |
| Software Masters, P.O. Box 1155, Evanston, Illinois 602 04.                                            |                              |                          |         |

## MACHINE CODE SCREEN FILL

This simple 16-byte machine code program fills the screen with any character. It executes faster and takes up less space than the BASIC program by Paul Qualls, Jr., in Jun.82 (p.20).

The MC routine is contained in this REM statement:

```
1 REM Y: NOT $TAB AND TAB
  RANDTAN
```

There are 16 keystrokes after REM. For easy typing, follow this guide. Finished result should look like the line above:

```
1 REM Y inverseSPACE graphicT
graphic4 : inverseK tokenNOT $
tokenTAB inverseH tokenRND graphic5
tokenTAB graphicY tokenRND tokenTAN
Don't type any spaces. Spaces in
line 1 come from keywords (tokens).
```

Execute line 1 by entering RAND USR 16514 in the FAST mode. Almost instantly, the entire screen blackens. The second keystroke after REM is the fill character, here inverse space. To change this character, substitute another for the inverse space, or POKE the new character's code to address 16515 in the immediate mode (with no line number). Be sure this REM line is the first line in your program.

The assembly listing for this routine (128 in location 16515 is inverse space) follows next page.

If you'd rather POKE the decimal values in, use a loader program:

```
1 REM (16 spaces)
2 FOR X=16514 TO 16529
3 INPUT I
4 POKE X,I
5 NEXT X
```

RUN, then input the numbers in the assembly listing dec. column, hitting ENTER or NEWLINE after each. After the last number press LIST then ENTER or NEWLINE to see the listing again. Line 1 now looks like Dr. Miller's line 1. Delete lines 2-5. Or use David Ornstein's XFER hex loading program (Jun.82) to load the hex numbers.--AZ



| Loc.  | Dec. | Hex | Opcode         | Comment                               |
|-------|------|-----|----------------|---------------------------------------|
| 16514 | 62   | 3E  | LD A,N         | ;load code of fill character in A     |
| 16515 | 128  | 80  |                |                                       |
| 16516 | 6    | 06  | LD B,04        | ;set LOOP1 counter for 4 iterations   |
| 16517 | 4    | 04  |                |                                       |
| 16518 | 14   | 0E  | LOOP1: LD C,B0 | ;set LOOP2 counter for 176 iterations |
| 16519 | 176  | B0  |                |                                       |
| 16520 | 215  | D7  | LOOP2: rst 10  | ;character printing routine           |
| 16521 | 13   | 0D  | DEC C          | ;reduce LOOP2 counter by 1            |
| 16522 | 194  | C2  | JPNZ,LOOP2;    | if C=0, go to LOOP2                   |
| 16523 | 136  | 88  |                |                                       |
| 16524 | 64   | 40  |                |                                       |
| 16525 | 5    | 05  | DEC B          | ;reduce LOOP1 counter by 1            |
| 16526 | 194  | C2  | JPNZ,LOOP1;    | if B=0, go to LOOP1                   |
| 16527 | 134  | 86  |                |                                       |
| 16528 | 64   | 40  |                |                                       |
| 16529 | 201  | C9  | ret            | ;B=0, return to BASIC                 |

Using a loop within another loop, this ML program executes the character printing routine exactly 704 times ( $4 \times 176 = 704$ ), which fills the screen. By POKEing smaller values into registers B and C, you can fill as much of the screen as you wish.

Harold Miller, Clarkesville, GA

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## MACHINE CODE--CP BRANCHING TESTS

CPs are 1-3 byte codes that compare two numbers. More exactly, they subtract the number you are looking for from what has been loaded into the Accumulator. The general method of using CPs is to set up a loop that will "peek" into a block of addresses serially, or one after another.

For instance, suppose you have a block of data in REM addresses and you want to return to BASIC at the last piece of data:

1. Choose a number that is not valid data, say 23, and store it in the last data address in the block.
2. Initialize a register pair as a "data pointer" with an INCRement instruction. Load A with the contents of the address pointed to. (LD A,(BC) for example, where BC holds the current data address and is stored on the stack.)
3. Compare the new data to "23" (CPn, where n=23).
4. If the data is 23, the Z flag is set for a test so you can branch (either to BASIC or to reset the pointer). If the data is not 23, A still contains valid data (only the Flags are affected), the branch-test (RET Z, JR Z, etc.) fails, and the data can be processed.

CPs are simple to use if you understand two things: A must be loaded with "unknown" data from an address, and you must follow the CP with a test-and-branch depending on which Flag you test (JR C, CALL PO, nn, RET NZ, JP M,nn, for example).

In addition to CPs, the Z80 also has a few instructions that actively search and test data automatically. With these, however, you must load-initialize HL with the data address and load BC with the number of addresses to search (iterations of the automatic loop).

Next: TESTING BITS FOR BRANCHING

Jon Bobst, Zeta Software, PO Box  
3522, Greenville, SC 29608-3522

## SPACES IN REM STATEMENTS

If you put your machine code in large REM statements, you need not laboriously type in spaces or digits. This 8K/16K program produces a REM statement containing up to 14991 full stops. You choose the number you want at line 40.

Delete lines 10-130 after running. You can change the line number for the REM statement by editing line 200 after your REM line is created. If the line is too big to edit, POKE 16510,1 works after you delete lines 10-130. Lines 20 and 30 are fool-proofing; I would not advise deleting them until you are happy with your REM statement.

This routine simply builds up the REM line one byte at a time, calling the ROM routine that makes one space and moves all the pointers up each time. It's quicker to make all the spaces at once, but a bit more complicated to program. Using this method, a 500-byte REM line takes less than 20 seconds.

If you prefer digits 1234..., change line 100 to:

```
100 POKE D+I,I-10*INT (I/10)+28
```

Hex code in line 10 reads:

```
1D 1E 2A 82 40 CD 9B 09 C9
```

The keystrokes in line 10 after 10 REM are:

number1 number2 letterE graphic-  
shiftW tokenRND tokenLN inverse  
period graphicshiftD tokenTAN  
Don't type any spaces.

Frank O'Hara, Surbiton, Surrey, UK

```
10 REM 126LRNDLN E-TAN
20 PRINT "ENTER 200 REM; THEN
GOTO 40"
30 STOP
40 INPUT N
50 LET D=PEEK 16396+256*PEEK 1
6397-2
60 FOR I=1 TO N
70 POKE 16515,INT ((D+I)/256)
80 POKE 16514,D+I-256*PEEK 165
15
90 RAND USR 16516
100 POKE D+I,27
110 NEXT I
120 POKE D-1,INT ((N+2)/256)
130 POKE D-2,N+2-256*PEEK (D-1)
SYNCTACTIC SUM: 17705, 8K
```



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0-8K . . . Sinclair ROM

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Memotech Corp. 7550 W. Yale Ave. Suite 220 Denver, Colo. 80227

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STX08

This game pits you against your 8K computer. The playing field is a rectangle with two different starting points. The computer controls the + character and you control the inverse \*. You try to maneuver the computer's string of plusses into a box the leading plus cannot get out of. The computer will not hit the boundary, itself, or your string of asterisks as long as the lead plus can move in a direction that is not occupied. You win when the computer is unable to find a clear direction. You lose if your string is trapped.

To control your string, use these four keys:

K right  
J left  
M down  
I up

(See Jun.82 p.10 for info on adding a joystick to your ZX81.--AZ) If you do not push a key for movement, the computer will continue your string to the right. So be careful not to let your lead asterisk double back on itself. Changing line 266 to GOTO 530, 550 or 490 moves the asterisk in another direction if nothing is pressed.

Each symbol is mapped into memory by the POKE command at its corresponding coordinates. B in line 60 is a random memory location for storing information.

The program runs again automatically. To exit, press BREAK.

Wayne C. DeJulia, Ozone Park, NY

```
50 CLEAR
55 CLS
60 LET B=30000
65 FAST
70 FOR L=2 TO 19
71 FOR M=2 TO 30
72 POKE B+L*40+M, CODE (" ")
73 NEXT M
74 NEXT L
80 RAND
110 FOR N=1 TO 31
120 PRINT AT 21,N; " "
130 PRINT AT 1,N; " "
140 POKE B+21*40+N, CODE (" ")
150 POKE B+1*40+N, CODE (" ")
160 NEXT N
```

```
170 FOR N=1 TO 21
180 PRINT AT N,1; " "
190 PRINT AT N,31; " "
200 POKE B+N*40+1, CODE (" ")
210 POKE B+N*40+31, CODE (" ")
220 NEXT N
225 SLOW
230 LET A=INT (RND*16+2)
240 LET C=INT (RND*26+2)
250 PRINT AT A,C; "+"
251 POKE B+A*40+C, CODE (" ")
252 LET D=INT (RND*17+2)
253 LET E=INT (RND*26+2)
254 PRINT AT D,E; " "
255 POKE B+D*40+E, CODE (" ")
256 LET M$=INKEY$
258 IF M$="K" THEN GOTO 510
259 IF M$="J" THEN GOTO 530
260 IF M$="M" THEN GOTO 550
261 IF M$="I" THEN GOTO 490
262 GOTO 510
270 LET C=C+1
272 IF PEEK (B+A*40+C) <> CODE (" ") THEN GOTO 290
273 PRINT AT A,C; "+"
275 POKE B+A*40+C, CODE (" ")
280 GOTO 256
290 LET C=C-1
300 LET C=C-1
302 IF PEEK (B+A*40+C) <> CODE (" ") THEN GOTO 340
310 PRINT AT A,C; "+"
320 POKE B+A*40+C, CODE (" ")
330 GOTO 256
340 LET C=C+1
341 LET A=A+1
342 IF PEEK (B+A*40+C) <> CODE (" ") THEN GOTO 400
350 PRINT AT A,C; "+"
360 POKE B+A*40+C, CODE (" ")
370 GOTO 256
400 LET A=A-1
403 LET A=A-1
405 IF PEEK (B+(A*40)+C) <> CODE (" ") THEN GOTO 450
410 PRINT AT A,C; "+"
420 POKE B+(A*40)+C, CODE (" ")
430 GOTO 256
450 CLS
460 PRINT AT 10,10: "YOU WIN"
461 PAUSE 100
465 GOTO 50
490 LET E=E-1
500 IF PEEK (B+D*40+E) <> CODE (" ") THEN GOTO 700
501 PRINT AT D,E; " "
502 POKE B+D*40+E, CODE (" ")
503 GOTO 270
510 LET E=E+1
520 IF PEEK (B+D*40+E) <> CODE (" ") THEN GOTO 700
521 POKE B+D*40+E, CODE (" ")
522 PRINT AT D,E; " "
523 GOTO 270
530 LET D=D-1
540 IF PEEK (B+D*40+E) <> CODE (" ") THEN GOTO 700
541 POKE B+D*40+E, CODE (" ")
545 PRINT AT D,E; " "
547 GOTO 270
550 LET D=D+1
560 IF PEEK (B+D*40+E) <> CODE (" ") THEN GOTO 700
565 POKE B+D*40+E, CODE (" ")
570 PRINT AT D,E; " "
575 GOTO 270
700 CLS
705 PRINT AT 10,12: "YOU LOSE"
715 PAUSE 100
720 GOTO 50
SYNTACTIC SUM: 42089, 8K
```



## BOOK REVIEW

Title: Getting Acquainted with  
Your ZX81 (3rd. Ed.)  
Author: Tim Hartnell  
From: Creative Computing Press  
Price: \$8.95 paperback

This British book is a good way to move beyond the ZX81 manual if you're new to computers. Between fascinating graphic display programs (Star Map, Micro Mouse) and challenging games (Space Boy, Alien Imploders) is a reasonable amount of explanatory text.

Hartnell is, from time to time, very good at setting problems for his readers to work out. This is essential in any teaching text, and it is good to find it here.

Significant discussion is given to saving memory by refining programs (with some examples), RND, SCROLL, program-writing suggestions, using arrays and a fair amount more. Finally, after some work programming and numbering a checker board for efficient use in programs is a version of checkers.

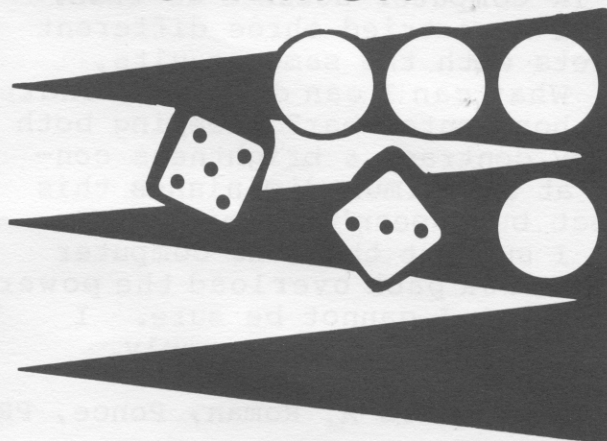
The last ten pages may be as much help as all the rest. Hartnell discusses how to change programs from 4K to 8K ROM, gives a set of specifications, a table to convert system variables from old to new ROM, and a listing of the character set, ending with directions for replacing a 4K ROM with an 8K one.

There are minor problems with the book beyond the British names. It is occasionally hard to read programs correctly; at least once I read O for zero and F for E. Using report codes and some detective work, you can figure these out.

Although I haven't run all of the more than 80 programs, extensive sampling and reading all the text showed this to be a very helpful book for anyone just getting into the ZX81.

Ronald H. Miller, Murrysville, PA

## SOFTSYNC, INC. **NEW RELEASES!** ZX81—TS1000— BACKGAMMON



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**DEAR EDITOR:**

Since adding a Sinclair 16K RAM expansion, a horizontal bar travels constantly up my screen. The 1K computer doesn't do this.

I have tried three different TV sets with the same results.

What can I do to eliminate this horizontal bar? Keeping both the TV contrast & brightness control at a minimum diminishes this effect but doesn't eliminate it.

I suspect that the computer and the 16K pack overload the power supply but I cannot be sure. I have the 650 MA power supply.

Luis A. Roman, Ponce, PR

That's right--your power supply has excessive ripple. Sam Porter suggests you increase C3 in the computer from 22uF to 220uF (Apr.82 p.18), but see the following letter and answer for alternatives.--KO

Sam Porter's fix for charger ripple (April 82) treats the symptom, not the disease. Horizontal "hum" bars on the screen do result from a weak charger, but the power supply is weak because a component has failed. The most likely culprit is one of the two diodes soldered to the transformer windings inside the plastic case. If one diode opened, supply capacity drops by 1/2 and more hum results. Adding capacitance reduces the hum to a workable level, but replacing the diode is a better fix.

To get inside the sealed plastic case, use a sharp knife to cut the plastic welds along the crack between the case top and bottom.

The power supply already has a 1000 uf, 16V cap in it.

William Bosley, Valparaiso, FL

Chargers can also develop excess ripple if the transformer is badly wound. Voltages would be within specs, but ripple would be high,

especially after warmup. You cannot easily repair bad windings, so get a new unit. ZX80/1 owners should write to Sinclair Research, 1 Sinclair Plaza, Nashua, NH 03061. Use this address for all parts, manuals, and ROM upgrades.--KO

If you added a big keyboard and need to label 8K functions on the keys, here's a suggestion from Chuck Ludinisky of Chelmsford, MA. Find a Sinclair ad in the computer magazines; color in Kilobaud or Byte, b/w in SYNTAX. Cut out the keyboard picture and glue the labels to your keytops with household (airplane) glue. Cover with tape or clear nail polish. The labels are small, but readable.

Cliff Danielson, Chelmsford, MA

Sometimes pressing on the top of my ZX81 case in certain areas causes a crash. Static from my hand isn't causing it. Do you know what might be causing the problem and what the solution is?

Hugh B. Amber, Mississauga, Ont.

Check the insulation between ground strap & circuit board--sometimes the tape punctures. Cracked traces & solder joints give similar symptoms.--KO

In Apr.82, Don Shank, Palo Alto, CA, wrote about problems with his ZX81's power jack connection. I had the same problem with my power connection. (Sinclair should fix this!) I wouldn't put up with this problem nor would I put my computer on the shelf. Replacing the existing power plug with an RCA type plug would solve this problem, so I got the necessary parts from a local electronics store and installed them. Problem solved.

I am by no means an electronic repairman but this plug can be installed with a little imagination and care. You need only a screw-



driver, a relatively inexpensive soldering iron and about 2" of 16 to 18 gauge wire.

I hope Mr. Shank reads this letter and takes his ZX81 back off the shelf. He's missing a lot of pleasure and an enjoyable teaching aid for himself and his family.

David L. Isabel, Farmington, MO

I am just starting on the ZX81 and am looking for info:

- 1) Where to get parts to build add-on RAM
- 2) Switch to color
- 3) Printer interface
- 4) List of owners in my area (especially amateur radio operators & electronics builders, computer technicians)

James R. Copeland, Crozet, VA

Check electronics surplus houses for inexpensive parts for hardware projects. They often advertise in the back of computer magazines like Byte. We have bought from BNF in Peabody, MA, and John J. Meshna in Lynn, MA.

Several people are working on color boards for ZX81s. Watch SYNTAX for details.

Printer interfaces with ASCII conversion are available from Byte-Back, Rt. 3, Box 147, Brodie Rd., Leesville, SC 29070; Data-assette, 52 S. 3rd St., Oxford, PA 19363; and Memotech Corp., 7550 W. Yale Ave., Suite 200, Denver, CO 80227.

To reach amateur radio users, contact Marty Irons, K2MI, 46 Magic Circle Dr., Goshen, NY. He runs a free newsletter only for amateur radio people with ZX81s. To find local ZX users groups, see p.3.--AZ

My problem is that prepared tapes LOAD satisfactorily; however tapes SAVED from the computer do not LOAD. The audio signal from the tape is much weaker than the prepared tapes (obviously what is going out isn't strong enough).

The output from IC1 pin 16 exits via R29 (1M) and C12 (47pfd) to MIC jack with R27 (1K) and C11 (47nfd) to 0 volt bus.

Is there any obvious reason why I cannot SAVE programs? Should I disconnect R30?

A.R. Newhouse, Potomac, MD

Do not disconnect R30; it creates the US TV scan and plays no role in SAVE and LOAD. Try a borrowed tape recorder, and use a short (C-30 or smaller) tape. Next, check the component values or substitute others, and inspect the solder joints and printed circuit traces. Measure the output from the MIC jack on your computer--you should get 1-5 millivolts.

If you find no problem, we recommend you exchange the unit or send it for repair.--KO

I think I understand "phantom memory" (addresses above 37767), but I don't understand why some 8K ROM code references locations in the phantom memory. For example, there is a CALL PO,58085 (hex E2E5) at 171 (hex 00AC) and a JP PO,57310 (hex DFDE) at 180 (hex 00B4). Or is my disassembly all wet? Similarly, more appear to be many references to locations between 8192 and 16383 (hex 2000 to 3FFF). I can accept this more readily but still have some trouble with it.

Why don't I have 17K of RAM with my 16K RAM add-on?

James H. Canfield, Dayton, OH

Addresses 00AC and 00B4 contain text or tabulated values, not commands. Locations 007E to 01FB contain the key tables. Unless you like doing your own disassembly, you can use Ian Logan's, available direct from Ian in England or from several North American suppliers.

Adding 16K external memory disables the internal 1K that comes with the ZX80/81.--KO

## PROGRAM IMPROVEMENTS

Grandson of Big Characters (Jul.82)  
Here is a shorter version of Grandson of Big Characters which allows 27 4x-size characters on a 1K machine. Input them one at a time.

Paul Ezra, San Diego, CA

```

2 LET G=43
4 INPUT A$
6 FOR B=1 TO LEN A$
8 FOR C=0 TO 7
10 LET D=PEEK (7680+CODE A$(B)
12 *8+C)
14 FOR F=0 TO 7
16 LET E=2*(7-F)
18 IF D>=E THEN PLOT 8*(B-1)+F
20 ,G-C
22 IF D>=E THEN LET D=D-E
24 NEXT F
26 NEXT C
28 NEXT B
30 LET G=G-8
32 GOTO 4
SYNTACTIC SUM: 14534, 8K

```

BASIC Line Renumbering (Jun.82)  
This modification provides more flexibility and often negates the need to change GOSUBS and GOTOS. Because it lets you specify the last program line to renumber, you can retain subroutine starting addresses.

Use this program the same way as the original: type it in, SAVE it, then reload before typing in a new program. Call the renumber program by entering GOTO 9980 in the immediate mode. To exit early, enter DELETE then STOP.

You can learn a lot about how the computer handles programs by manipulating program lines or giving several lines the same number (increment by 0). Try this:

```

50 SLOW
40 PRINT AT 21,11;"GOODBYE"
30 FOR X=1 TO 22
20 SCROLL
10 NEXT X

```

It runs fine if entered using normal (low to high) line numbers and renumbered with increment -10. (Editing or adding new lines can be a little tricky, though).

William Bosley, Valparaiso, FL

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CHECKS



```

9970 STOP
9971 LET A=16589
9972 INPUT S
9973 PRINT S
9974 LET L=256*PEEK A+PEEK (A+1)
9975 IF L=S THEN RETURN
9976 IF L>=9970 THEN GOTO 9979
9977 LET A=A+4+PEEK (A+2)+256*PE
EK (A+3)
9978 GOTO 9974
9979 PRINT S;"NOT FOUND"
9980 PRINT "LAST LINE TO BE RENU
MBERED=";
9981 GOSUB 9971
9982 LET AE=A+3
9983 PRINT "1ST LINE TO BE RENUM
BERED=";
9984 GOSUB 9971
9985 PRINT "1ST NEW LINE NUMBER=";
9986 INPUT N
9987 PRINT N;"INCREMENT LINES BY
..."
9988 INPUT I
9989 PRINT I
9990 IF A>AE THEN GOTO 9997
9991 IF N>9969 THEN GOTO 9999
9992 POKE A,INT (N/256)
9993 POKE (A+1),N-256*INT (N/256)
9994 LET A=A+4+PEEK (A+2)+256*PE
EK (A+3)
9995 LET N=N+I
9996 GOTO 9990
9997 PRINT "RENUMBER COMPLETE"
9998 STOP
9999 PRINT "CANT COMPLETE. LIN
E NR>9969."
SYNTACTIC SUM: 39756, 8K

```



## Powers of Negative Numbers

The formula for powers of negative numbers that William Tracy attributes to Sinclair (Jun.82 p.12) contains three mistakes. Line 10 of the program following corrects these. The program also shows some powers of -2. I have checked the formula for positive numbers and zero also. Zero to a negative power overflows, as it should.

Frank O'Hara, Surbiton, Surrey, UK

```
2 LET A=-2
5 FOR B=-5 TO 16
10 PRINT ABS A**B*(1-(B-2*INT
(B/2))*(1-SGN A)),
20 NEXT B
```

## PRINTING ON THE BOTTOM LINE--8K

According to Sinclair's programming manual, you cannot PRINT on the bottom two screen lines. This is not quite true. Here are two different ways to PRINT where you aren't supposed to.

### 1. One way:

```
10 LET L=USR 2591
20 PRINT "THE BOTTOM LINE"
30 PAUSE 1000
```

USR 2591 is a routine in the 8K ROM that clears the bottom part of the screen and is then effectively PRINT AT 23,0;. This method is crash-proof, but AT and TAB still won't work at the bottom.

### 2. Another way:

```
10 POKE 16418,0
20 PRINT AT 23,7;"THE BOTTOM L
INE"
30 FOR N=0 TO 23
40 PRINT AT N,0;N
50 NEXT N
60 POKE 16418,12
70 PAUSE 1000
```

You can now PRINT to the entire screen, even using AT and TAB. Be careful--if you INPUT while address 16418 (DF SZ) is less than 2, the computer crashes. PLOT still starts two lines above the bottom.

Jason Harper, Sylvester, TX

## BOOK REVIEW

Title: The Expandable ZX80 and ZX81

By: John F. Jarrett

From: Computer Engineering Services, The Jarrett Company, PO Box 1222, Show Low, AZ 85901, 602/537-7522

Price: \$9.95 + 1.25 shipping

If you are unsure about which is the business end of a soldering iron, then pass this book by. But for the dyed-in-the-wool hobbyist, it is a must.

Mr. Jarrett offers seven documented projects and several ideas for additional projects. The projects include two memory expansions, two different sound generators, a 5 amp power supply, a lamp/motor controller, and a Digitalker (tm) so your computer can talk to you! All projects come fairly well documented, with parts listings, photos, and schematics. The author suggests you wirewrap most of the projects. I agree, unless you have some skill at designing and making your own printed circuit cards.

There are some things I don't enjoy about this book. Mr. Jarrett ignored both his large keyboard and his enclosure for his expanded ZX80. I feel these are important, as there is no sense to making the projects if you don't have a place to put them! Also, while Mr. Jarrett did include a parts list for every project, he did not always provide stock numbers. Perhaps he didn't wish to favor any one company.

On the whole, I liked the book and its projects. I feel the 8x11" softcover is well worth the \$9.95 price tag. I will most likely construct all the projects, as cash flow allows. Again, this book is a must for builders who wish to make the most of their Sinclair ZX80 or ZX81 computer.

Patrick M. Spera, Tinker AFB, OK

## HARDWARE REVIEW

Product: Memotech 64K Memopak  
From: Memotech Corp., 7550 W.  
Yale Ave., Suite 200,  
Denver, CO 80227,  
303/986-1516.  
Price: \$179.95 + \$4.95 shipping

My 64K Memopak arrived within three weeks of mailing my check to Memotech. The module plugs directly into the Sinclair port straight out of the box, with a duplicate port exposed on the back for connecting the printer. It is completely self-contained and requires no external power supply. Since the case is as wide as the computer, Memotech provides double-sided foam tape to secure the unsupported end to the Sinclair. With the tape, the Memopak is much less susceptible to jarring and glitches than the Sinclair module.

The instructions are easy to understand and include an explanation of the 4 tiny switches accessible through the back panel. They switch in or out 4K-blocks of memory between 0000 and 16383 and come preset to disable the first 8K of memory (corresponding to the 8K ROM). Thus you really have 56K of usable RAM. Even though the first 8K is not available, it is implemented in hardware "for future developments." You can only use the second 8K for machine language programs, and it is safe from NEW. The next 16K works just like Sinclair's module. To tell the system that there is yet another 32K above this area, you must POKE RAMTOP to 65535. Although BASIC listings cannot extend into the top 32K, they can now occupy almost the entire 16K area below because all program data and the stacks are relocated. Refer to the ZX81 manual, p.128; everything above the line marked VARS is moved to the top 32K so the BASIC listing can be up to about 15K long.

Operation of the Memopak is

quite satisfactory. Subjectively, I got 5% more TV interference than with the 16K module. This looks like faint moire patterns, but never so severe as to be obtrusive. The screen clears quickly when things warm up, and plugging in the cassette recorder seems to help! There is no overheating or evidence of unreliability. SAVE and LOAD work normally, and tapes made with the 16K also LOAD fine. Should you want to expand a data array on a 16K tape, you must re-enter your old data manually.

The unit comes with a 6-month guarantee, not 90 days.

ZX80 users can connect the Memopak to their machines, but the computer must be modified: change one connection and add a resistor.

The Memopak is undoubtedly the ultimate memory expansion for the Sinclair. Try DIM A(9500)!

Gene Alvarez, Oviedo, FL

Daren Lyons, Swartz Creek, MI, also wrote about his 64K Memopak. He agreed with Gene, except that his ZX81 power pack tends to overheat with the Memopak attached. He added, "The reaction time is slowed. When the pack is attached, things get real slow. Commands used outside of programs, and some used inside, get slow enough to watch the screen clear line by line, and RUN, LIST, etc., take forever to make any action known to the user."

Our Memopack works well and fits snugly on the ZX81. The documentation is good, answering first-time users' questions. It also gives demonstration programs. But the part explaining the function of the rear switches is unclear. Restated, this 64K RAM always gives you memory from 16K to 64K. For normal operation, SW1 is always off. SW2 turns 8-12K block on or off. SW3 turns 12-16K on or off. If all others are off, you must turn SW4 on.--AZ



## TEACH KIDS TO COUNT WITH THE ZX81

Some education theorists suggest that learning to count and read is enhanced if you create a large, sharp image in a child's mind. This image should be easily recognized and repeated often.

Rapidly moving TV pictures get credit (and blame) for generating very powerful attention-grabbing images that anyone watching learns quickly. With your ZX81 and some intelligent program design, your TV can provide sharp graphic images of concepts you want to teach.

I wrote this program, COUNT, to help my three-year-old son learn to equate a group of objects with a number. The game draws a random number of objects on the screen and asks, "How many?" If he answers correctly, the computer tells him he's right and draws another set. If he's wrong, the computer asks for another answer.

Since my son can barely count much less read, written text is kept to a minimum. To keep things interesting, the program generates several shapes that occur randomly.

COUNT fits in a 1K machine, with a little extra room if you want a fancier win display. Once you enter the listing and save it, just tell your child to push R for RUN. The game repeats until you pull the plug.

Tom Woods, Jefferson, NH

To enter COUNT, use this guide. All keys are in graphics mode (press shift 9 first).--AZ

|      |     |       |   |       |   |         |
|------|-----|-------|---|-------|---|---------|
| line | 100 | shift | Y | shift | T |         |
|      | 105 | shift | T | shift | Y |         |
|      | 200 | shift | 8 | shift | G | shift 5 |
|      | 205 | shift | 8 | shift | F | shift 5 |
|      | 300 | shift | R | shift | E |         |
|      | 305 | shift | Q | shift | W |         |
|      | 400 | shift | W | shift | W | shift 5 |
|      | 405 | shift | E | shift | E | shift 5 |
|      | 500 | shift | W | shift | T |         |
|      | 505 | shift | E | shift | Y |         |

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The words in reverse in lines 45  
and 55 are WRONG and RIGHT with  
asterisks.

```

1 LET A=INT (RND*10)+1
5 GOTO 100*(INT (RND*5)+1)
7 FOR X=0 TO A-1
10 PRINT AT 9,X*3+1;A$
15 PRINT AT 10,X*3+1;B$
20 NEXT X
25 PRINT AT 0,0;"HOW MANY?"
30 INPUT D$
35 IF CODE D$>37 OR CODE D$<28
THEN GOTO 45
40 IF VAL D$=A THEN GOTO 55
45 PRINT D$;"*WRONG*"
50 GOTO 30
55 PRINT AT 20,6;"*RIGHT*"
60 PAUSE 100
65 CLS
70 GOTO 1
100 LET A$="X"
105 LET B$="X"
110 GOTO 7
200 LET A$="X"
205 LET B$="X"
210 GOTO 7
300 LET A$="I"
305 LET B$="I"
310 GOTO 7
400 LET A$="H"
405 LET B$="H"
410 GOTO 7
500 LET A$="H"
505 LET B$="H"
510 GOTO 7
SYNTACTIC SUM: 35437, 3K

```

## STRING FUNCTION TRANSLATION FOR 8K

While using my 8K ROM and manual I took up the exercise on strings that asks you to work out the equivalents of LEFT\$, RIGHT\$, MID\$ and TL\$. The result is this demonstration program.

Arthur J. Bumpus, Jr., Brockton, MA

This demo is set up for strings of more than 7 characters, using 7 as the variable each time. Try substituting other numbers. LEFT\$, RIGHT\$, MID\$ and TL\$ are functions common to other microcomputers. These conversions will help you translate from other BASICS.--AZ

```

10 REM "STRING FUNCTIONS"
20 REM ZX80/8K ROM
30 REM ART BUMPUS
50 REM LEFT$ (A$,N)
60 GOSUB 500
70 LET N=7
80 REM PRINTS UP TO 7TH CHAR.
90 LET B$=A$(1 TO N)
100 PRINT B$;"""LEFT$(A$,N)""
110 REM RIGHT$ (A$,N)
120 GOSUB 500
130 LET N=7
140 REM PRINTS FROM 7TH TO END
150 LET B$=A$(N TO )
160 PRINT B$;"""RIGHT$(A$,N)""
170 REM MID$ (A$,N1,N2)
180 GOSUB 500
190 LET N1=7
200 LET N2=1
210 LET N3=N1+N2
220 REM PRINTS 1 CHAR. FROM THE
  7TH
230 LET B$=A$(N1 TO N3)
240 PRINT B$;"""MID$(A$,N1,N2)""
250 REM TL$(A$)
260 GOSUB 500
270 LET B$=A$(2 TO )
280 REM THIS DROPS THE 1ST CHAR
290 PRINT B$;"""TL$(A$)""
300 PRINT "PROGRAM COMPLETED"
310 STOP
500 INPUT A$
510 PRINT A$;"=";
520 RETURN
SYNTACTIC SUM: 33443, 8K

```

## DIAGONAL LINES

You can make 45 degree angles with two nested FOR-NEXT loops:  
1. Diagonal line from lower left to upper right:

10 FOR A=X TO X where X is lower left point

20 FOR B=X TO N where N is upper right point  
30 PLOT A,B  
40 NEXT A  
50 NEXT B

2. Diagonal line from upper left to lower right:

10 FOR A=X TO X where X is upper left point  
20 FOR B=N TO X STEP -1 where N is lower right point  
30 PLOT A,B  
40 NEXT A  
50 NEXT B

Here is the listing for "M". Lines 10-30 and 140-160 plot the vertical uprights.

```

10 FOR A=10 TO 30
20 PLOT 0,A
30 NEXT A
40 FOR B=1 TO 1
50 FOR C=30 TO 24 STEP -1
60 PLOT B,C
70 NEXT B
80 NEXT C
90 FOR D=7 TO 7
100 FOR E=24 TO 30
110 PLOT D,E
120 NEXT D
130 NEXT E
140 FOR F=10 TO 30
150 PLOT 14,F
160 NEXT F

```

Charles Myler, San Antonio, TX

## SHIFTING MAZE--8K/1K

This program prints a maze on a 1K ZX81. Run in SLOW for best effect.

```

10 FOR R=0 TO 19
20 FOR C=0 TO 19
30 PRINT CHR$(INT (RND+.5)*2+3);
40 NEXT C
50 PRINT
60 NEXT R

```

For a shifting maze, add:

```

5 PRINT AT 0,0;
70 GOTO 5

```

To exit, press BREAK.

John Burns, Biocal Software,  
Fairfax, CA



## MACHINE CODE PROGRAMMING-- UNDERSTANDING THE STACK

Often when writing machine code (MC) programs, it's useful to keep the MC above RAMTOP. But few people understand how to move RAMTOP and the Z80's stack pointer from within MC. The following details let you protect your MC programs from being overwritten by using the stack.

In the ZX80/1 with 8K ROM, the system variable RAMTOP holds the address of the first location above usable memory, whether the top of available RAM or as specified by the programmer.

The next two bytes, going down from RAMTOP, are always 3Eh and 00h. This pair of bytes marks the top of the GOSUB stack and constitutes an invalid line number. Using a RETURN command that fetches line 3E00 (15872 in decimal) leads to a "7" error.

Below the top marker of the GOSUB stack are the return line numbers of any GOSUB loops that are active. However, most times a machine code programmer isn't dealing with BASIC subroutines; hence the GOSUB stack will consist of the top marker alone.

Next comes the point which, in my manual (p.171) is explained wrongly--the system variable ERR-SP, the error stack pointer, points not to the GOSUB stack but to the two bytes below it. These two bytes always hold the BASIC LINE-RUN return address, 0676h. The interpreter always returns to this address after executing subroutines involved in the interpretation of a single line.

The normal machine code stack is below the LINE-RUN return address.

An important point to note is that if an error occurs during part of the interpretation of a BASIC line, all the MC stack's details are discarded as a return is made to the address held in ERR-SP, ie.,

0676h.

Creating a new stack under programmer's control involves correctly placing four bytes--3Eh, 00h, 06h and 76h--and giving appropriate values to the stack pointer and ERR-SP. The following routine shows one way to do this:

| Mnemonic        | Comment                             |
|-----------------|-------------------------------------|
| LD HL, +....    | ;your choice for RAMTOP             |
| LD (RAMTOP), HL | ;enter it                           |
| DEC HL          | ;point to 1st location              |
| LD (HL), +3E    | ;the impossible line #              |
| DEC HL          | ;point to 2nd location              |
| LD (HL), +00    | ;the line #'s low byte              |
| DEC HL          | ;point to 3rd location              |
| LD (HL), +06    | ;return address-high                |
| DEC HL          | ;point to 4th location              |
| LD (HL), +75    | ;low byte of address                |
| INC (HL)        | ;so as to avoid "76"                |
| LD (ERR-SP), HL | ;this is to be ERR-SP               |
| LD SP, HL       | ;and the machine code stack pointer |

continue....

This routine lets you run a MC program above RAMTOP that will not be overwritten by use of the stack. You can make a perfectly valid RETURN to BASIC if needed.

Note: As I mentioned, whenever an error occurs during the interpretation of a BASIC line, the machine code stack is cleared. But the GOSUB stack is left untouched. Hence "active" GOSUB return addresses remain on the stack, using up RAM at 2 bytes for each address.

It remains to be seen if this "bug" occurs in the monitor program of the ZX Spectrum.

Ian Logan, Skellingthorpe, UK

For further details, see Dr. Logan's books, Understanding Your ZX81 ROM and Sinclair ZX81 ROM Disassembly, Part A and Part B (with Dr. Frank O'Hara). All three are available direct from Ian Logan, 24 Nurses Lane, Skellingthorpe, Lincoln LN6 5JT, UK, or from any North American distributor for Melbourne House Publishing.--AZ

## SYNTACTIC SUM LOADER

New Readers: Syntactic Sum is a machine code routine devised by SYNTAX to help you assure correct program entry. If two people type a program exactly the same, they get the same Syntactic Sum. If one makes an error, the Sums differ. The Sum we get when we test each program appears after the last line of the published version, along with the ROM designation. The following loader program greatly simplifies using Syntactic Sum for 8K ROM programs.--AZ

This program provides a Syntactic Sum machine language routine in just one step instead of the original multi-step process. Just LOAD and RUN it, and the Syntactic Sum program is resident. It also prints the starting address of the subroutine for the USR call.

The first part, Listing 1, consists of a REM statement holding all the machine code needed to move the Z80 microprocessor stack and change all appropriate system variables. This has the same effect as POKEing a new value into the system variable RAMTOP, then executing a NEW. The second part POKES a Syntactic Sum subroutine into the newly created space at the top of memory.

To enter this program, follow these steps:

1. Enter the program in Listing 4.
2. RUN it.
3. INPUT the values in Table 1. Read them across and press ENTER or NEWLINE after each. After the last one, the REM statement in line 1 should have changed to look like line 1 in Listing 1 following.
4. Enter lines 10-90 of Listing 1, replacing lines 10-40 of listing 4.

To use this program, type RUN. ALWAYS RUN THIS PROGRAM IN THE FAST MODE. If you SAVE it in FAST, you'll just have to LOAD and RUN it.

When you run this program, it

returns the number of bytes saved above RAMTOP and the starting address of the subroutine (INPUT USR nnnnn). You can access the routine anytime by entering PRINT USR nnnnn where nnnnn is the address displayed. The computer does not have to be in FAST mode to use Listing 1. To clear the Syntactic Sum loader program from memory before typing or loading a program, hit NEW and ENTER or NEWLINE.

This program automatically calculates locations, so you can use it with any size memory with no changes.

You can also use it to load other subroutines: Put the code (in hex) in line 10. The first two characters of A\$ are lost in conversion, so start your code with the third character. Change line 50 to TO N+(# of bytes - 1). Change line 20 to POKE 16507,(number of bytes). WARNING--you must POKE a number greater than 19 or the computer crashes. You can also use this program to load more than one subroutine at a time. Each time the program is run, the subroutine will be put at the top of available memory.

This program, together with other self-loading utilities, is available on cassette for \$4.00.

Roderick McConnell, 28 Orchard St.,  
Glen Head, NY 11545

### Listing 1

```
1 REM REM AND GOSUB ???T GOSU
5 ??AND GOSUB ? FOR ; GOSUB GO
SUB ??RND AND GOSUB P16 RND RN
D GOSUB P16 RND GOSUB ?T GOSUB P
I RND TAN
10 LET A$="XXAF47676FE52A0C401
17D402B4EE309E3E5ED52E120F5C1C9"
20 POKE 16507,24
30 PRINT USR 16514;" BYTES SAV
ED"
40 LET N=PEEK 16388+256*PEEK 1
6389
50 FOR X=N TO N+23
60 LET A$=A$(3 TO )
70 POKE X,16*(CODE A$-28)+CODE
A$(2)-28
80 NEXT X
90 PRINT " INPUT USR ";N
SYNTACTIC SUM: 19638, 8K
```



# LISTING 4

```

1 REM 12345678901234567890123
456789012345678901234567
10 FOR X=16514 TO 16560
20 INPUT N
30 POKE X,N
40 NEXT X

```

## TABLE 1--read across

|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| 175 | 42  | 4   | 64  | 237 | 114 |
| 68  | 77  | 3   | 57  | 237 | 91  |
| 123 | 64  | 237 | 82  | 235 | 25  |
| 237 | 184 | 237 | 75  | 123 | 64  |
| 42  | 4   | 64  | 237 | 66  | 34  |
| 4   | 64  | 42  | 2   | 64  | 237 |
| 66  | 34  | 2   | 64  | 237 | 98  |
| 57  | 237 | 66  | 249 | 201 |     |

## DICE ROLL-4K/1K

This program turns your 4K ZX80 into a totally fair dice roller. It's a lot quieter than standard dice and saves disagreements about what was actually rolled.

Enter Dice, then RUN (graphics & spaces are described in PRINT lines). Hit NL for each roll. To exit, enter any character.

Lines 40 and 50 roll the dice. Subroutine 700 arranges the "dots" on the face of each die. Subroutine 800 prints the die on the screen. Who says a 1K ZX80 can't help you play Monopoly!

Robert Masters, Tewksbury, MA

```

5 LET A$="7space shiftQ 7space"
10 LET B$=CHR$(130)
15 LET X$="7space shiftQ"
30 RANDOMISE
40 LET X=RND(6)
50 LET Y=RND(6)
60 LET Z=X
70 GO SUB 700
80 GO SUB 800
90 PRINT
100 LET Z=Y
110 GO SUB 700
120 GO SUB 800
130 INPUT Q$
135 CLS
140 IF Q$="" THEN GO TO 40
150 STOP

```

```

700 LET C$="shiftA 3space shiftA"
701 LET D$=C$
702 LET E$=C$
705 IF Z=1 THEN LET C$="5space"
706 IF Z=1 THEN LET E$=C$
710 IF Z=1 OR Z=3 OR Z=5 THEN LET D$="2space shiftA 2space"
720 IF Z=2 OR Z=3 THEN GO SUB 750
730 IF Z=2 OR Z=4 THEN LET D$="5space"
740 RETURN
750 LET C$="shiftA 4space"
760 LET E$="4space shiftA"
770 RETURN
800 LET Z$="shiftW"
805 GO SUB 900
810 PRINT A$;B$
820 PRINT X$;C$;"space";B$
830 PRINT A$;B$
840 PRINT X$;D$;"space";B$
850 PRINT A$;B$
860 PRINT X$;E$;"space";B$
870 PRINT A$;B$
875 LET Z$=CHR$(131)
880 GO SUB 900
890 RETURN
900 PRINT "7space";
910 FOR I=1 TO 10
920 PRINT Z$;
930 NEXT I
940 PRINT
950 RETURN

```

SYNTACTIC SUM: -22490, 4K

## CARDIOID PLOT--8K/1K

Cardioid plots a heart-shaped curve with 1K RAM--an attempt to describe the speed-apparent wind diagram for a given sail at constant wind speed. The results can help predict optimum sailing conditions.

Frederic D. Bogar, Key West, FL

```

10 FOR T=PI TO 0 STEP -.05*PI
50 LET A=(1+COS T)*COS T
60 LET B=(15*SQR ((1+COS T)**2 -ABS A**2))
70 LET X=32+B
80 LET Y=30-15*A
90 PLOT X,Y
100 LET X=32-B
110 PLOT X,Y
120 NEXT T
130 STOP
SYNTACTIC SUM: 12340, 8K

```

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